ANNE

X X

Adap

tive

Cohe

rence

&

Resilience

Extension

(ACRE)

(Inform

ative → Normat ive Option

al

Annex)

X.1

Purpo

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This annex

specifi
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minim
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requir
ement
s for
adapti

V

e,
stress
-
resilie

nt

syste

ms

operati

ng

under

uncert
ainty,
comple
xity,

and evolving risk conditi

O

ns.
It
enhanc
es

existing management

systems by introducing

continuous adaptation,

failure metabolization,

and

constraint inheritance

as

operational safeguards.

X.2 Scop

e

This annex

applies to:

- AI system

s

- Robot
ic
system

s

- Cyber

-

physic

al

systems

- Critical

infrastr

ucture

- Organ

ization

al

decisio

n

system

s

It is

compatible with:

- ISO

9001

(Quality)

- ISO/IEC

27001 (Security)

- ISO

31000 (Risk)

- ISO 22301

(Continuity)

- ISO 56002

(Innov
ation)

- ISO/
IEC

23894 / AI risk standar

ds

X.3 Norm

ative Princi

ples

System

s

conforming to this annex

shall adhere to the followi

n

g
principl
es:

X.3.1 Continuous

Stress

Validation System

s shall be exposed to

intenti
onal,
recurr
ing

stress scenarios

repres

e

ntative of:

- Extreme

conditi
ons

- Comp
ound

failures

- Novel operational

contex
ts
Stress
exposu

r

e **shall not** be limited to

post-

incident analysis.

X.3.2 Failure

Surface Mappi

ng

System

s shall

mainta
in a
failure
surfac

e

registry, including:

- Actual failures
- Near-misses

- Masked failures
- Succe

S

sful
recove
ries
under

stress

Succes

sful

recove

r

y **does not exempt** the

event from logging.

X.3.3 Mandatory

Adapti
ve
Varian

t

Gener

ation

For each identified

failure
or
stress
outco

m

e, the system **shall gener**

at

e one

or

more

adapti

ve

variants, including:

- Structural variants

- Constraint variants

- Operational variants

“No change required”

shall

not be an acceptable

terminal state.

X.3.4

Resilience-Weigh

ted Evaluation

Variant
s shall
be
evaluat

ed
using
multi-
criteri

a

scoring

where:

- Resili

ence

and
recove
rability
outwei

gh

efficien

cy

- Stabili

t

y
under
stress
outwei

ghs
peak
perfor
mance

- Graceful degradation

outran
ks
throug
hput

X.3.5 Controlled

Integration Selecte

d variants shall be

integra
ted
using
phase

d

deplo

yment

, with:

- Rollba

C

k

capabil

ity

- Transi

ti

on risk analysis

- Shock

minimi
zation
control
s

Abrupt system replacement

shall
be
treated
as a

risk

event.X.3.6 Const

raint Memory

Encoding Lessons

learne
d shall
be
encode

d as:

- Updated constra

ints

- Harde

ned

default

s

- Modified thresh

O

Ids
Knowle
dge
shall

influence future syste

m
behav
io

r, not merely documentatio

n.

X.4 Mini

mum

Opera

tional

Loop (Requ

ired)

Confor

ming

system
s **shall**
imple
ment

the

following loop:

- Stress

Injectio

n

- Failur

e

Detecti

on

- Variant Generation

- Fitness

Evaluation

- Control

led

Integra

tion

- Const

r

aint Encoding

- Repea

t

This loop **shall operat**

e

contin uously, not episodi

cally.

X.5 Recor

ds

and

Evidence Organiz

ations shall retain eviden

C

e of:

- Stress scenarios

executed

- Failure

surface

s
identifi
ed
- Varian

t

s

evaluat

ed

- Integr

a

tion decisions

- Const

r

aint
update
s
Eviden

C

e may be automated.

X.6 Comp

atibilit

y

Statement

Imple

m

entatio
n of
this
annex:

- Does

not
conflict
with
existin

g ISO clauses

- May be

declare
d as a
supple
menta

r

y
conformity
exten

on

- May be audite

d

independently or

jointly

X.7

Trans

ition Path

way
(Poin

t-and-

Click Adop

tion)

Organi

zations

may
adopt
this
annex

via:

- Pilot implementatio

n in a single domain

- Shado

w
operati
on
alongsi

de
existin
g
system

s

- Partial clause adopti

O

n
(X.3.1–
X.3.3
minim

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m

recom

mende

d)

Full adoption is **non-**

disrup
tive to
certific
ation

status.

X.8 Outco

mes

Systems

implementing this annex

demonstrate:

- Reduced

catastr
ophic
failure
probab

lity

- Increa

sed

adaptiv

e

capacit

y

- Impro

V

ed
long-
term
stabilit

y

- Lower

system

ic

fragilit
y
under
uncert

ainty

End of Annex

X